1961

Third Annual Sheep Field Day, 1961

Animal Husbandry Department
South Dakota State College

Agricultural Experiment Station
South Dakota State College

THIRD ANNUAL

SHEEP FIELD DAY

MARCH 30, 1961

Animal Husbandry Department
Agricultural Experiment Station
South Dakota State College
College Station, Brookings, South Dakota

Third Annual
Sheep Field Day
March 30, 1961

Stock Pavilion

Dr. Richard C. Wahlstrom, Chairman

10:40	Value of Enzymes and Antibiotics for Fattening Lambs	Dr. L. B. Embry
11:00	Urinary Calculi in Sheep	Dr. Royce Emerick
11:20	Comparison of Oral and Implanting Stilbestrol with and without Dynafac	Dr. L. B. Embry
11:40	Comparison of Early with Late Shearing and Early with Late Lambing	Dr. L. F. Bush
12:00	Lunch - Lamb	

James O'Connell, Chairman

1:00	Opening Remarks	Dr. O. G. Bentley
1:15	Sheep Production Costs	L. J. Kortan
1:35	Breeding for Production	J. W. McCarty
2:00	How We Benefit From Production Records on the Ewe Flock	H. R. Barnett, Brookings Robert Ingle, Cavour
2:40	Reproduction Studies in Sheep	Dr. Jack Wagner

SOUTH DAKOTA STATE COLLEGE
Animal Husbandry Department Brookings, South Dakota
Agricultural Experiment Station
A. H. Mimeo Series 61-14

Value of Various Feed Additives for Fattening Lambs Fed High-Concentrate Rations

L. B. Embry, B. A. Weichenthal, F. W. Whetzal and L. D. Kamstra

Lambs have commonly been considered to be efficient in the utilization of roughage. Fattening lambs are generally fed rations composed of 50 per cent or more roughage. It has been the common opinion that feeding less roughage than this does not improve the performance of the lambs but increases losses from overeating disease and other digestive disorders.

In studies with fattening lambs during the past three years, we have obtained rather low feed requirements per unit of gain by full feeding lambs mixed rations composed of 20-25 per cent ground alfalfa hay and 75-80 per cent concentrates. The improvement in feed efficiency over high-roughage rations has been more pronounced than the improvement in rate of gain. Losses from overeating disease of non-vaccinated lambs have not been any greater than with rations containing about 50 per cent roughage.

Two lamb fattening trials were conducted to further test the response of lambs to high-concentrate rations. Various feed additives, reported to have some effect on feed utilization or control of diseases and digestive disorders, were tested to determine their value when fed with high-concentrate rations.

Procedure

Lambs

A total of 288 ewe and wether lambs from a summer experiment on intensity of grazing native range at the Antelope Range Substation, Buffalo, South Dakota, were used in the experiment. The lambs were predominantly Rambouillet breeding. They were weaned in late September and trucked to Brookings where they were full fed alfalfa-bromegrass hay for about two weeks before being put on the experiment.

The lambs were divided into groups according to weight for different experiments. One group of 144 heavy lambs and one group of 144 light lambs were used in the two trials of this experiment. The average initial weight and number of ewes and wethers on each treatment are shown in table 1.

They were not treated for control of internal parasites. Some lambs required trimming of wool around the eyes but they were not sheared.

Feeds

The lambs were fed in outside lots without shelter in lots of 12. They were fed a complete mixed ration starting at a rate of 0.5 pound daily and brought up to a full feed over a 2-week period. After reaching full feed, they were fed twice daily so feed would be available at all times. All lambs were implanted with 3 mg. of diethylstilbestrol.

The basal ration was composed as follows:

	%
Ground alfalfa hay	25
Rolled shelled corn	70
Trace mineral salt	1
Dicalcium phosphate	1
Soybean meal	3
Vitamin A supplement (20,000 I.U./gm.)	1 gm.

This basal ration was supplemented with the different feed additives to make a total of six treatments, each being fed to two lots of 12 lambs in the two trials. The treatments were as follows:[1]

1. Control

2. Dynafac[2] - 200 mg./lb. of ration
   An antibacterial compound (chemobiotic) fed as a premix containing 80% bone meal and 20% dynafac.

3. Rum-A-Lak[3] - 200 mg./lb. of ration
   A fungal enzyme preparation also fortified with vitamins and trace minerals.

4. Zymo-Pabst[4] - 500 mg./lb. of ration
   A multiple enzyme preparation of bacterial and plant origin.

5. Bacitracin[5] - 10 mg./lb. of ration
   An antibiotic. The supplement used contained 10 gm. bacitracin per pound.

6. Aureomycin[5] - 10 mg./lb. of ration
   A supplement (Aurofac-10) containing 10 gm. of the antibiotic, chlortetracycline, per pound.

Dynafac replaced an equal amount of dicalcium phosphate in the basal ration while the other feed additives were used to replace soybean meal.

The alfalfa hay was ground with a hammer mill using a 1 inch screen. The corn was coarsely rolled. A premix was made up of the other ingredients including the different additives in amounts necessary for 1 ton of complete ration. This premix was added to the grain hay mixture and blended in a 2-ton twin spiral vertical mixer.

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[1] The feed additives will be referred to by trade name where the product is more commonly known by the trade name or where a chemical name may not accurately describe the product.

[2] Furnished by Armour and Company, Chicago, Illinois.

[3] Furnished by Northern Biochemical Company, Sheldon, Iowa.

[4] Furnished by Pabst Brewing Company, Milwaukee, Wisconsin.

[5] Furnished by American Cyanamid Company, Pearl River, New York.

Results

The results of the two trials are presented in table 1. The data from the two replicates have been averaged and presented as the total treatment effects. There did not appear to be any important difference between ewes and wethers in the rate of gain response to the different treatments and they are presented together. The average gain for wethers was slightly greater than for ewes. Ewes and wethers were fed in the same lots and difference in feed consumption and feed efficiency could not be separated.

All lambs were implanted with 3 mg. diethylstilbestrol which usually results in a considerable improvement in rate of gain. The results from the different treatments reported here were obtained with lambs treated with diethylstilbestrol.

The feed additives were tested at only one level with these rations. In some cases, the effects of different levels of the product have not been thoroughly tested. The results presented should be considered in terms of the level fed with the high-concentrate rations. Other levels and other types of rations may have resulted in a different response.

Dynafac

The heavy lambs fed dynafac for a period of 40 days gained 0.55 pound in comparison to 0.52 pound for the control group. This amounted to an increase of 5.8 per cent. The lambs fed dynafac also required 6.4 per cent less feed per 100 pounds of gain.

In the 68-day trial with the lighter lambs, those fed dynafac gained 0.04 pound less per head daily (7.7%) than the control group and required slightly more feed.

The small and variable difference between the lambs fed dynafac and the control group in these two trials indicates that it was having little if any effect on performance of the lambs in these trials.

Results with lambs fed dynafac at this station in the past have been variable. In some trials, it appeared to have a beneficial effect while in others no response was obtained. An increase in rate of gain has been obtained in enough trials to indicate that it does exert a favorable effect under some conditions. The response has not been consistent enough, however, to recommend the general use of dynafac for fattening lambs.

Rum-A-Lak

Lambs fed the enzyme preparation, Rum-A-Lak, in the 40-day trial gained the same as the controls but required less feed per 100 pounds of gain (7.0%). In the trial with the light lambs, those fed this product gained less than the controls and required slightly more feed. It would appear that this compound had no beneficial effect at the level used when fed with a high-concentrate ration such as used in this experiment. It was not tested at other levels and with other types of rations.

Zymo-Pabst

Lambs fed the enzyme preparation Zymo-Pabst gained 0.03 pound more daily (5.8%) than the control lambs in both trials. They also required less feed--9.5% and 5.6% less per hundred pounds of gain with the heavy and light lambs.

The response to this product is small but could be of practical importance when applied to large numbers of lambs. The fact that similar results were obtained in both trials indicates that it has some value in livestock rations, and this compound should be tested at other levels and with other types of rations. The level used in this experiment was rather high in comparison to rate of feeding used for most enzyme preparations.

Bacitracin

Lambs fed the antibiotic bacitracin gained 0.04 and 0.03 pound more per day than the control groups in the two trials (7.7 and 5.8%). They required 10.1 and 4.5 per cent less feed, respectively, in the experiment with heavy and light lambs. As in the case of Zymo-Pabst, the response was small but consistent but could be of considerable practical value when applied to large numbers of lambs.

Aureomycin

Lambs fed Aureomycin gained less than the controls in both trials with the difference being greater in the long trial with the light lambs. The most favorable response to Aureomycin when fed to lambs has been reported when feeding high-roughage rations. The level used in this trial has been shown to be about the most effective level with high-roughage rations for lambs. It is slightly more than twice the level used for continuous feeding of cattle. Lower levels might have given a more favorable response. However, feeding 10 mg. of the antibiotic per pound of the high-concentrate ration did not improve gains or feed efficiency in these two trials.

Death Losses

Only one lamb was lost from overeating disease in these two trials. The lamb was fed the ration with Zymo-Pabst. Thus, there was not test on the value of the different feed additives in preventing this disease except that the enzyme preparation Zymo-Pabst will not prevent it. Different antibiotics and dynafac have been reported to be effective in reducing the incidence of this disease. The losses are low for this high-concentrate ration and the lambs were not vaccinated for the prevention of the disease. Losses from overeating disease have been observed when lambs were fed antibiotics. It would be a good practice to vaccinate when feeding antibiotics or dynafac with high-concentrate rations until more information is available on the incidence of the disease with these high-concentrate rations and the effectiveness of various feed additives in preventing it.

Three lambs were lost from urinary calculi. One carcass was condemned because of uremia and another because of an infected kidney. It is not known if these two conditions were also associated with calculi formation.

Two other lambs were removed from the experiment with conditions of undetermined origin which did not appear to be associated with the treatments.

Feed Efficiency with High-Concentrate Ration

The amount of feed required per unit of gain was low with all the high-concentrate rations used in this experiment. The least feed required per 100 pounds of gain was with the enzyme Zymo-Pabst and the antibiotic bacitracin in each trial. The feed requirements for these two treatments were 484 and 481 in the 40-day trial with heavy lambs and 505 and 511 in the 68-day trial with light lambs. This shows that lambs are efficient in the utilization of high-concentrate rations. This feed requirement is considerably better than we have been able to obtain with cattle using similar high-concentrate rations.

Table 1. Response by fattening lambs to various feed additives when fed high-concentrate rations.

	Control	Dynafac	Rum-A-Lak	Zymo-Pabst	Bacit-racin	Aureo-mycin
Heavy Lambs: Oct. 7 - Nov. 16, 1960 (40 days)						
Number lambs	12W 12E	11W[a] 12E	11W[b] 12E	12W 11E[c]	12W 12E	11W[d] 12E
Av. initial wt., lb.	84.4	84.0	83.8	84.2	84.3	83.9
Av. final wt.,lb.	105.1	105.8	104.6	106.3	106.5	103.7
Av. daily gain, lb.	.52	.55	.52	.55	.56	.50
Per cent from Control		5.8	0	5.8	7.7	-3.8
Av. daily ration, lb.	2.77	2.73	2.60	2.67	2.67	2.62
Feed/100 lb. gain, lb.	535	501	500	484	481	527
Per cent from Control		-6.4	-7.0	-9.5	-10.1	-1.5
Light Lambs: Oct. 11 - Dec. 18, 1960 (68 days)						
Number lambs	9W 15E	8W[e] 15E	8W[f] 15E	8W[f] 14E[g]	9W 15E	9W 15E
Av. initial wt., lb.	66.7	66.3	66.6	66.2	66.6	66.5
Av. final wt., lb.	101.9	99.3	99.2	103.3	104.1	98.6
Av. daily gain, lb.	.52	.48	.48	.55	.55	.47
Per cent from Control		-7.7	-7.7	5.8	5.8	-9.6
Av. daily ration, lb.	2.77	2.68	2.63	2.75	2.82	2.73
Feed/100 lb. gain, lb.	535	552	547	505	511	578
Per cent from Control		3.2	2.2	-5.6	-4.5	8.0

Losses and removed from experiment

a. One lamb died from urinary calculi.
b. One lamb made poor gain. Carcass condemned at slaughter because of uremia.
c. One lamb lame and made poor gain. Removed from experiment.
d. One lamb made poor gain. Carcass condmned at slaughter because of kidney infection.
e. One lamb sick from undetermined cause and removed from experiment.
f. One lamb in each of these two lots died from urinary calculi.
g. One lamb died from overeating disease.

Lambs that died or were removed from the experiment are not considered in the results. An average feed for each lamb was deducted from that offered during the time each lamb was in the lot.

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URINARY CALCULI

by R. J. Emerick and L. B. Embry

What is it?

The term, urinary calculi, is used to describe deposits of solid material (principally mineral matter) within the urinary tract. The calculi, which may occur as single stones or gravel-like concretions approaching the consistency of sand, are often named according to their location within the urinary tract; hence names such as kidney stones and bladder stones.

Symptoms do not generally occur until the stones grow large enough to lodge in the urinary tract and block the flow of urine. If blockage is complete and the stone is not eliminated or removed, the volume of urine accumulating in the bladder increases until rupture of the bladder or urethra occurs. The resulting condition is often called "water-belly".

Types of Calculi:

Calculi composed of various materials have been observed. Two distinctly different types occur most frequently in South Dakota. One type is chiefly composed of calcium and magnesium phosphate and occurs most often under feed-lot conditions. The other type has silica as its principal constituent. This type, called the siliceous type, is most generally found in animals receiving roughage as the major feed, or in animals grazing matured grass. It is known, however, to occur in the feed-lot in some instances.

What causes it?

The exact cause(s) of urinary calculi are not known. It appears, however, that no one feed mixture or environmental condition can be predicted to consistently cause the disease. High mineral water has often received blame, but no correlation has yet been demonstrated between the mineral content of water and the incidence of urinary calculi. The experimental results, that we have obtained thus far, merely demonstrate some of the factors which may contribute to urinary calculi without revealing the basic causes or conditions necessary for calculi formation.

High Dietary Phosphorus as a Contributing Factor:

High levels of phosphorus in the ration have been shown to result in the formation of calcium and magnesium phosphate calculi. When a phosphorus source was added to sheep rations to obtain a Ca:P ratio of 1:3, two sheep out of six developed heavy deposits in the bladder. Increasing the calcium level to obtain a Ca:P ratio of 3:1 in another sheep ration had no detrimental effect. Calcium added to the high phosphorus ration to obtain a Ca:P ratio of 1:1, however, protected the sheep from the calculi producing effect of the high phosphorus level.

Stilbestrol as a Contributing Factor:

Some reports have implicated diethylstilbestrol (D.E.S.) as a contributing factor in the development of urinary calculi. In an experiment designed to investigate this possibility two groups each containing 42 lambs were fed (1) control ration (oats, soybean meal and grass hay) - Ca:P ratio 1:1 and (2) control ration with sodium phosphate (Na_2HPO_4) to give a Ca:P ratio of 1:2. One-half of the sheep in each of the two groups were implanted with 6 milligrams of D.E.S. No evidence of urine blockage occurred over a period of approximately 100 days. At time of slaughter, however, the following numbers of urinary tract deposits (mostly kidney deposits) were found:

Treatment	No. Sheep per Treatment	No. Sheep With Urinary Tract Deposits	Av. Severity of Deposits[a]
Control	21	3	1.3
Control + D.E.S.	21	7	1.7
High Phosphorus	21	10	2.2
High Phosphorus + D.E.S.	21	8	1.6

[a] A numerical value indicating the average severity of the deposits and obtained by visually rating each deposit 1 to 3 on the basis of the quantity of material present.

The number of sheep with urinary tract deposits was greater when implanted with D.E.S. or when fed the high phosphorus ration. The combination of D.E.S. implants with the high phosphorus ration resulted in no more deposits than were noted with high phosphorus alone. Since the incidence of urinary tract deposits was greater in only one comparison involving D.E.S., additional work appears to be needed to determine if D.E.S. has any definite effect.

Experimental Work with Albino Rats:

Studies using the albino laboratory rat have shown that siliceous urinary calculi can be formed in this species by feeding a compound called tetraethyl orthosilicate. The feeding of this compound results in the excretion of high levels of silica in the urine as well as extensive kidney damage and growth depression. Comparable excretion values have been obtained in a different manner without any harmful effects, including calculi development. This indicates that animals are not going to develop urinary calculi merely because they are consuming, and subsequently excreting, large quantities of silica.

We are trying to determine the combination of factors necessary for the development of urinary calculi. We can make definite recommendations for the prevention of this costly disease only after this has been accomplished.

What can be done about it?

Surgery is the most successful treatment for existing cases of urinary calculi. The relief afforded calculi-prone animals, however, may be only temporary.

No single preventative method has been devised for the prevention of calculi. In general, applying the following rules should help minimize losses due to urinary calculi.

1. Provide an adequate water supply at all times. An adequate water intake helps to assure proper elimination of excretory products without creating an excessively concentrated urine. Encourage water consumption by keeping it clean, readily available, and warm in the winter. Quite often water consumption can be increased by feeding modest amounts of salt in the ration. Some experiments stations report that lambs perform satisfactorily on rations containing as high as 10% salt, though this level is probably higher than necessary. The amount of salt used should not be large enough to reduce consumption of the ration.

2. Provide an adequate balance of calcium to phosphorus by adding a calcium source such as ground limestone to high phosphorus rations (high concentrate rations are normally high in phosphorus).

3. Feed good quality legume hay whenever possible. It is a good source of calcium and is also slightly diuretic.

4. If siliceous calculi have been previously encountered the use of high-silica feeds may have to be limited.

By following these recommendations one should be able to minimize losses due to urinary calculi under most conditions. However, until we fully understand the many factors involved in the formation of urinary calculi, it will be difficult to anticipate all of the conditions that one will have to avoid to completely prevent urinary calculi.

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Value of Diethylstilbestrol and Dynafac for Fattening Ewe and Wether Lambs

B. A. Weichenthal, L. B. Embry and F. W. Whetzal

Diethylstilbestrol (DES) is available for use in fattening lambs at a level of 2 mg. per head daily in the feed and as ear implants of 3 mg. per animal. Advantages in favor of feeding compared to implanting have not been well established although implanting has generally been more effective in stimulating rate of gain. The response by wethers appears to be of considerably greater magnitude than the response by ewes.

The value of dynafac in rations for fattening lambs has been studied to a limited extent. This product is referred to as a chemobiotic having antibacterial properties mainly within the digestive tract. The action of this feed additive is thought to be that of controlling harmful microorganisms within the digestive tract without impairing beneficial ones needed for digestion of feed. Reports from various workers have shown variation in the response to dynafac. The control of "overeating disease" in fattening lambs by feeding dynafac has been reported. More work is needed on this particularly when feeding high-concentrate rations.

Two lamb fattening trials were conducted to obtain more information on the comparative value of implanting and feeding diethylstilbestrol to ewe and wether lambs. Dynafac was fed with and without diethylstilbestrol to further test its value in high-concentrate rations for fattening lambs.

Procedure

One hundred sixty-three ewe and wether lambs which had been used during the previous summer in grazing trials with different varieties of alfalfa were used in this experiment. They were out of grade Western ewes and were sired by Hampshire and Columbia rams.

After being taken off the alfalfa grazing trials at three different substations, the lambs were trucked to Brookings and full-fed alfalfa-bromegrass hay until started on the experiment. Wool blind lambs were trimmed around the eyes but were not sheared. They were not vaccinated for the prevention of overeating disease in order to test the value of dynafac in preventing this disease.

The range in weight of the lambs was large. They were divided into a group of 55 heavy lambs (Trial I) and a group of 108 light lambs (Trial II).

Trial I (Heavy Lambs)

Twenty-two wether and 33 ewe lambs were used in this trial. The lambs were allotted to six treatments as shown in table 1. The treatments were: Control, DES implant and DES orally, with and without dynafac in each case. Feed consumption was estimated to be 3 lb. per head daily. DES and dynafac were added to the appropriate rations so the lambs would receive 2 mg. of DES and 0.5 gm. dynafac when consuming 3 pounds of feed. A 3-mg. DES pellet was placed under the skin of the ear for lambs receiving this treatment.

Table 1. Response by Heavy Feeder Lambs to DES and Dynafac when Fed a High-Concentrate ration (Sept. 1 to Oct. 20, 1960, 48 days)

	No Dynafac			0.5 mg. Dynafac		
	Control	3 mg. DES Implant	2 mg. DES Oral	Control	3 mg. DES Implant	2 mg. DES Oral
Number Lambs in Lot	4W5E	4W5E	3W6E	3W6E	4W5E	4W6E
Initial Ave. Wt.	87.7	87.7	87.0	86.7	87.7	87.0
Wethers	87.7	87.2	86.7	86.7	87.5	87.5
Ewes	87.6	88.2	86.3	86.8	88.0	86.5
Final Ave. Wt.	108.7	113.1	105.7	106.7	113.6	104.7
Wethers	108.5	114.0	107.3	108.0	113.1	109.3
Ewes	108.8	112.4	104.8	106.0	107.5	101.7
Ave. Daily Gain	.44	.53	.39	.42	.54	.37
Wethers	.43	.56	.41	.44	.61	.45
Ewes	.44	.50	.38	.40	.48	.32
Ave. Daily Ration	2.88	2.93	2.64	2.99	3.07	2.79
Feed/100 lb. Gain[a]	658.6	554.3	671.8	720.9	571.5	751.7
Feed Cost/100 lb. Gain	12.91	10.86	13.17	14.13	11.20	14.73
Market Weight	103.3	106.7	100.6	101.6	108.3	101.5
Shrink (lb.)[b]	5.33	6.44	5.11	5.00	5.22	3.20
% Shrink	4.9	5.7	4.8	4.7	4.6	3.1
Dressing %	52.1	52.3	52.1	52.2	51.0	52.2
Carcass Conformation	21.89	22.33	22.11	22.33	21.78	23.00
Wethers	21.50	22.25	22.00	22.00	21.75	23.00
Ewes	22.20	22.40	22.17	22.50	21.80	23.00
Carcass Finish[c]	21.67	21.56	20.89	20.67	20.56	21.60
Wethers	21.25	21.50	19.30	21.30	20.50	23.25
Ewes	22.00	21.60	21.67	20.33	20.60	20.50
Carcass Grade[c]	22.00	21.56	21.82	21.11	21.11	21.70
Wethers	21.50	21.00	21.30	21.00	21.00	23.25
Ewes	22.40	22.00	21.17	21.17	21.20	20.66

a Feed prices used: Alfalfa hay, $25/ton; soybean meal, $70/ton; rolled shelled corn, $40/ton; trace mineral salt, $45/ton; dicalcium phosphate, $100/ton; complete ration, $1.96/cwt.

b 18 hours off feed but not water including a 75-mile haul.

c Based on following scores: Prime, 23; Choice, 20; Good, 17. Graded to 1/3 grade.

The basal ration consisted of 20% ground alfalf hay, 73% rolled shelled corn, 5% soybean meal, 1% trace mineral salt and 1% dicalcium phosphate. Vitamin A was added to furnish 200 I. U. per pound of total ration. The DES premix replaced an equal amount of soybean meal in the rations where it was used, while dicalcium phosphate was replaced with dynafac in the rations when this product was used.

The corn was coarsely rolled and the alfalfa hay was ground with a hammer mill using a 1 inch screen. The other ingredients were premixed and mixed with the corn and hay in a twin spiral vertical mixer in 1000-lb. batches.

Feeding was started at 0.75 pound per head daily of the complete ration. The amount of feed was raised 0.1 pound per head daily until the lambs were on full feed. After reaching full feed, they were fed twice daily in amounts so feed would be available at all times.

The lambs were weighed at 14-day intervals during the trial. All weights, including the initial and final, were taken without shrink. They were weighed by lots at market to determine shrink and dressing per cent based on market weight. The carcasses were weighed and graded for finish, conformation and over-all grade.

Trial II (Light Lambs)

Fifty-four wether and 54 ewe lambs were used in this trial. They were allotted to 9 treatments with 6 wethers and 6 ewes per lot. The treatments and initial weights are shown in table 3. Treatments were the same as for Trial I expect dynafac was also fed at 1 gm. per head daily (See table 3). Other procedures during this trial were essentially the same as for Trial I.

Results

Trial I (Heavy Lambs)

The heavy lambs averaging about 87 pounds initially required a feeding period of 48 days to reach the desired market grade and weight. Results of the trial are presented by lots in table 1 and by over-all treatment effects in table 2. The gains and the carcass characteristics studied are shown separately for ewes and wethers. Since ewes and wethers were fed in the same lots, data on feed consumption and feed efficiency could not be separated for them.

There was a difference in the response in rate of gain by ewes and wethers when given DES, therefore, they should be considered separately. The number of each sex per lot is rather small; and thus, the over-all effects of treatments shown in table 2 afford a better comparison of the treatments.

Wether lambs implanted with 3 mg. of DES gained 0.58 pound in comparison to 0.44 pound for the controls. The increase amounted to 31.8%. When the wether lambs received about 1.8 mg. DES in the feed (2 mg./3 lb. feed) the rate of gain was about the same as for the control group. The lack of response to DES in the feed does not agree with most reported work. The small number of wethers receiving this treatment and the short time the trial was conducted are probably factors influencing the results.

Ewe lambs implanted with 3 mg. DES gained 0.49 pound, 16.7% more than the controls. When fed DES, they gained at a considerably lower rate than the control group.

Considering ewes and wethers together feed consumption was increased slightly when they were implanted with 3 mg. DES. Feed efficiency was improved an average of 18.6%. When DES was fed, feed consumption was less and more feed was required per 100 pounds of gain than for the control group. Because of the difference in the rate of gain response of ewes and wethers to DES, feed requirements would be expected to be lower for wethers only and higher for ewes only than that shown for both in table 2.

Dressing per cent was obtained only on a lot basis. The differences shown are not considered important with this number of lambs.

Table 3. Response by Light Feeder Lambs to DES and Dynafac When Fed a High-Concentrate Ration (Sept. 1 to Nov. 21, 1960, 81 days)

	No Dynafac			0.5 mg. Dynafac			1.0 gm. Dynafac		
	Control	3 mg. DES Implant	2 mg. DES Oral	Control	3 mg. DES Implant	2 mg. DES Oral	Control	3 mg. DES Implant	2 mg. DES Oral
Number Lambs in Lot	6W6E	6W5E[d]	5W6E[d]	6W6E	6W6E	6W6E	6W6E	6W6E	6W6E
Initial Ave. Wt.	64.2	63.9	62.6	64.2	64.1	64.1	64.1	64.1	64.2
Wethers	65.8	65.5	62.6	65.3	65.3	65.3	65.3	65.5	65.7
Ewes	62.7	62.0	62.7	63.2	63.0	63.0	63.0	62.8	62.7
Final Ave. Wt.	105.3	110.8	107.1	104.6	109.9	106.3	102.3	110.2	103.8
Wethers	108.2	118.0	110.0	106.0	113.3	110.3	103.5	115.2	110.2
Ewes	102.3	102.2	104.7	103.2	106.5	102.2	101.2	105.2	97.5
Ave. Daily Gain	.51	.58	.55	.50	.56	.52	.47	.57	.49
Wethers	.52	.65	.58	.50	.59	.56	.47	.61	.55
Ewes	.49	.50	.52	.49	.54	.48	.47	.52	.43
Ave. Daily Ration	2.85	3.14	2.75	2.81	2.99	2.71	2.68	2.90	2.71
Feed/100 lb. Gain	562.5	541.7	500.2	563.5	529.3	522.2	568.0	511.3	554.4
Feed cost/100 lb. Gain[a]	11.02	10.62	9.80	11.04	10.37	10.24	11.13	10.02	10.87
Market Wt.	99.6	105.5	100.9	99.2	103.8	100.4	97.1	105.0	97.5
Shrink (lb.)[b]	5.67	5.36	6.18	5.42	6.17	5.83	5.25	5.17	6.33
% Shrink	5.4	4.8	5.8	5.2	5.6	5.5	5.1	4.7	6.1
Dressing %	50.9	51.4	50.3	52.0	50.3	50.0	51.3	49.4	51.7
Carcass Conformation[c]	21.67	22.36	22.54	22.17	22.08	22.08	22.25	22.33	22.25
Wethers	21.83	22.33	21.40	22.67	22.17	21.67	22.33	22.33	22.33
Ewes	21.50	22.40	23.50	21.67	22.00	22.50	22.17	22.33	22.17
Carcass Finish[c]	21.08	21.54	21.64	21.00	21.42	20.92	21.25	21.33	21.25
Wethers	21.00	22.00	21.20	21.17	21.50	21.00	21.50	21.67	21.50
Ewes	21.17	21.00	22.00	20.83	21.33	20.83	21.00	21.00	21.00
Carcass Grade[c]	21.08	21.45	21.64	21.00	21.42	21.00	21.17	21.33	21.17
Wethers	21.00	21.83	21.20	21.17	21.50	21.17	21.33	21.67	21.33
Ewes	21.17	21.00	22.00	20.83	21.33	20.83	21.00	21.00	21.00

a Feed prices used: Alfalfa hay, $25/ton; soybean meal, $70/ton; rolled shelled corn, $40/ton; trace mineral salt, $45/ton; dicalcium phosphate, $100/ton; complete ration, $1.96/cwt.

b 18 hours off feed but not water including a 75-mile haul.

c Based on following scores: Prime, 23; Choice, 20; Good, 17. Graded to 1/3 grade.

d One lamb died in each lot. Results calculated only for lambs finishing trial. An average feed consumption was deducted during time the lambs were in the lots.

Table 2. Summary of Responses by Heavy Feeder Lambs to DES and Dynafac When Fed A High-Concentrate ration (Sept. 1 to Oct. 20, 1960, 48 days)

	Stilbestrol			Dynafac	
	None	3 mg. Implant	2 mg. Oral	None	0.5 gm.
Number Lambs in Lot	7W11E	8W10E	7W12E	11W16E	11W17E
Initial Ave. Wt.	87.2	87.7	87.0	87.5	87.1
Wethers	87.2	87.4	87.1	87.2	87.2
Ewes	87.2	88.1	86.4	87.4	87.1
Final Ave. Wt.	107.7	113.4	105.2	109.2	108.2
Wethers	108.3	113.6	108.4	109.9	110.1
Ewes	107.4	110.0	103.2	108.7	104.9
Ave. Daily Gain	.43	.54	.38	.45	.44
Wethers	.44	.58	.43	.47	.50
Ewes	.42	.49	.35	.44	.40
Ave. Daily Ration	2.94	3.00	2.72	2.82	2.94
Feed/100 lb. Gain	689.7	562.9	713.8	628.3	683.9
Feed Cost/100 lb. Gain[a]	13.52	11.03	13.99	12.31	13.40
Market Weight	102.4	107.5	101.1	103.5	103.7
Shrink (lb.)[b]	5.16	5.83	4.10	5.63	4.43
% Shrink	4.8	5.2	3.9	5.1	4.1
Dressing %	52.1	51.6	52.1	52.2	51.8
Carcass Conformation[c]	22.11	22.06	22.58	22.11	22.39
Wethers	21.75	22.00	22.53	21.92	22.28
Ewes	22.35	22.10	22.61	22.26	22.45
Carcass Finish[c]	21.17	21.06	21.26	21.37	20.97
Wethers	21.27	21.00	21.38	20.68	21.74
Ewes	21.16	21.10	21.05	21.76	20.48
Carcass Grade[c]	21.56	21.34	21.76	21.79	21.32
Wethers	21.25	21.00	22.33	21.27	21.80
Ewes	21.78	21.60	20.90	21.86	21.00

a Feed prices used: Alfalfa hay, $25/ton; soybean meal, $70/ton; rolled shelled corn, $40/ton; trace mineral salt, $45/ton; dicalcium phosphate, $100/ton; complete ration, $1.96/cwt.

b 18 hours off feed but not water including a 75-mile haul.

c Based on following scores: Prime, 23; Choice, 20; Good, 17. Graded to 1/3 grade.

DES did not appear to influence carcass conformation and finish of either ewe or wether lambs. Differences in carcass grade between ewes and wethers implanted or fed DES and the controls were small. All lambs were fed the same number of days. When fed in this manner, the DES treatments did not appear to have any important influence on the carcass characteristics studied.

The gains for both ewes and wethers fed dynafac were about the same as for the lambs not fed this product. Dynafac did not appear to have any important effect on the carcass characteristics studied. Apparently dynafac had no beneficial effect in this trial.

Trial II (Light Lambs)

The light lambs averaging about 64 pounds initially required a feeding period of 81 days to reach the desired market weight and grade. Results by lots are presented in table 3 and by total treatment effects in table 4. The lambs fed dynafac at either level appeared to respond to the DES treatment in the same manner as the lambs not fed dynafac. Therefore, the results of this trial will be discussed as presented in table 4. These lightweight lambs consumed about the same amount of feed daily as the heavy lambs in Trial I and made slightly larger gains.

Table 4. Summary of Responses by Light Feeder Lambs to DES and Dynafac When Fed A High-Concentrate Ration (Sept. 1 to Nov. 21, 1960, 81 days)

	Stilbestrol			Dynafac		
	None	3 mg. Implant	2 mg. Oral	None	0.5 gm.	1.0 gm.
Number Lambs in Lot	18W18E	18W17E[d]	17W18E[d]	17W17E	18W18E	18W18E
Initial Ave. Wt.	64.2	64.0	63.7	63.6	64.1	64.1
Wethers	65.5	65.4	64.6	64.7	65.3	65.5
Ewes	63.0	62.6	62.8	62.5	63.1	62.8
Final Ave. Wt.	104.1	110.3	105.7	107.7	106.9	105.4
Wethers	105.9	115.4	110.2	112.0	109.9	109.6
Ewes	102.2	104.7	101.4	103.0	104.0	101.3
Ave. Daily Gain	.49	.57	.52	.54	.53	.51
Wethers	.50	.62	.56	.58	.55	.54
Ewes	.48	.52	.48	.50	.50	.47
Ave. Daily Ration	2.78	3.01	2.72	2.91	2.84	2.76
Feed/100 Lb. Gain	564.7	527.0	526.3	535.6	538.3	544.6
Feed Cost/100 Lb. Gain[a]	11.06	10.33	10.32	10.50	10.55	10.67
Market Weight	98.6	104.7	99.6	101.9	101.1	99.9
Shrink (lb.)[b]	5.45	5.57	6.11	5.73	5.81	5.58
% Shrink	5.2	5.0	5.8	5.3	5.4	5.3
Dressing %	51.4	50.3	50.7	50.9	50.8	50.8
Carcass Conformation[c]	22.03	22.25	22.28	22.17	22.11	22.28
Wethers	22.28	22.28	21.81	21.85	22.17	22.33
Ewes	21.78	22.24	22.70	22.44	22.06	22.22
Carcass Finish[c]	21.11	21.43	21.26	21.41	21.11	21.28
Wethers	21.22	21.72	21.23	21.39	21.22	21.56
Ewes	21.00	21.11	21.26	21.38	21.00	21.00
Carcass Grade[c]	21.08	21.40	21.26	21.38	21.14	21.22
Wethers	21.17	21.66	21.23	21.33	21.28	21.44
Ewes	21.00	21.11	21.26	21.38	21.00	21.00

a Feed prices used: Alfalfa hay, $25/ton; soybean meal, $70/ton; rolled shelled corn, $40/ton; trace mineral salt, $45/ton; dicalcium phosphate, $100/ton; complete ration, $1.96/cwt.

b 18 hours off feed but not water including a 75-mile haul.

c Based on following scores: Prime, 23; Choice, 20; Good, 17. Grade to 1/3 grade.

d One lamb died in each lot. Results calculated only for lambs finishing trial. An average feed consumption was deducted during time the lambs were in the lots.

Wether lambs implanted with DES gained an average of 0.62 pound daily, 24 per cent more than the control group. This is a smaller difference than obtained in Trial I but it is a rather large increase. When the wether lambs received DES in the feed, the rate of gain was 0.56 pound daily, or an increase of 12% over the control group. This differs from the no response obtained from oral DES in Trial I but is more in agreement with previous work at this station. A response has generally been obtained from feeding DES but it usually is less than obtained from DES implants with lambs.

Ewe lambs gained 0.52 pound daily when implanted with DES, 8.3% more than the control group. When receiving DES in the feed, the gain was 0.48 pound daily which was the same as for the control group of ewes. This is in agreement with previous experiments at this station when DES has been administered to ewe lambs. A response by ewes to DES implants is usually obtained but much less than obtained with wethers. Ewes seem to respond little, if any, to DES when offered in the feed.

Feed consumption for the ewes and wethers was increased slightly when implanted with DES but not when it was included in the feed. Feed required per 100 pounds of gain was improved an average of 6.7% when the lambs were implanted. The lambs fed DES had about the same feed requirements as those implanted even though the rate of gain and feed consumption was less.

Feed requirements for wethers only would be expected to be lower and for ewes only higher than the average shown in table 4 as was stated for Trial I.

A slightly lower dressing per cent was obtained with both DES treatments. Any difference between ewes and wethers is not known because dressing per cent was obtained on a lot basis only. The lower dressing per cent was not consistently obtained for each lot receiving DES (table 3). A large number of lambs would be needed to show accurately the effects of DES on dressing per cent.

Lambs treated with DES graded as well on conformation, finish and carcass grade as those not treated with this compound. They were all fed the same number of days. Those treated with DES, especially the implanted group, were heavier. This is a factor to consider when marketing lambs.

Dynafac at approximately 0.5 and 1.0 gm. daily did not improve gain or feed efficiency in this trial. It did not appear to affect the carcass characteristics studied.

Two lambs apparently normal late in the afternoon were found dead the next morning. A post mortem examination could not be obtained, but the cause of death was suspected to be overeating disease. Neither lamb received dynafac.

Some trouble was encountered with scours early in the trial. Neither level of dynafac prevented scouring, but scouring was most persistent in one lot not receiving dynafac. Dynafac administered at 10 mg. daily appeared to be beneficial in clearing up cases of severe scours.

Summary

1. Diethylstilbestrol (DES) improved gains 31.8 and 24% in the two trials when wether lambs were implanted with 3 mg. Ewe lambs gained 16.7 and 8.3% more than the control ewes when implanted at this level.

2. Diethylstilbestrol fed at about 1.8 mg. daily (2 mg./3 lb. feed) resulted in an improvement of 12% in rate of gain with wether lambs in one trial but no improvement in the other trial (87 lb. lambs fed 48 days). Oral DES did not improve gains of ewe lambs.

3. Feed efficiency for the ewe and wether lambs was improved an average of 18.6% by implanting DES in one trial and 6.7% in the other. Feeding DES did not improve feed efficiency in the 48-day trial with heavy lambs but improved it to about the same degree as the implants in the trial with light lambs.

4. The DES treatments did not appear to have any important effects on dressing per cent, carcass conformation, carcass finish and carcass grade when the treated lambs were fed the same number of days as the non-treated lambs.

5. DES implants appear to produce a greater response than DES orally with fattening lambs. Wethers exhibit a greater response than ewes with ewes responding little, if any, to oral DES.

6. Dynafac appeared to have no effect in improving performance of fattening lambs in these two trials. Two lambs died, apparently from overeating disease, and neither received dynafac.

7. Gains and feed efficiency were good in the 81-day trial when the light lambs were fed a ration with 20% alfalfa hay and 80% concentrates.

SOUTH DAKOTA STATE COLLEGE
Animal Husbandry Department Brookings, South Dakota
Agricultural Experiment Station
A. H. Mimeo Series 61-12

Comparison of Early with Late Shearing and Early with Late Lambing

Leon F. Bush

The practice of shearing sheep before lambing has become popular within recent years. For those who lamb early this means shearing in January or February. Some of the reasons for early shearing are ease of caring for ewe and lamb at lambing time, in case of bad weather the ewe will seek shelter and will lamb inside or take her new-born lamb inside and also somewhat less space is required per ewe.

Ewes shorn in January or February will carry a six or seven month wool growth at breeding season. This may affect the fertility of the ewes. Early shown wool would be cleaner and perhaps of higher quality. The fleece weights per ewe may be lighter due to less wool grease and other impurities in the fleece.

Although South Dakota is not normally considered an area of early lamb production, more and more producers are breeding for early lambs. Early lambs are usually marketed on a higher market than late lambs but will require more feed for the ewe and lamb. One advantage may offset the other.

This experiment was conducted to study the effect of early shearing on amount and quality of wool produced and on fertility of the ewe. Eighty white faced western ewes were purchased the fall of 1959. These ewes were divided randomly into two lots of 40 ewes each. One lot of ewes was sheared in January and the other lot in May. Each of these lots was divided into an early lambing group and a late lambing group.

Ewes were bred to a Hampshire ram and breeding dates were recorded. Breeding season for early lambing began the 1st of August and for late lambing the 1st of November. All ewes were flushed before lambing. Four weeks before lambing ewes were started on 1/4 pound of grain. This was gradually increased until at lambing time 3/4 pound of grain was fed. The lactating ration of corn and oats was fed at the rate of 1 to 1 1/2 pounds until weaning time. Late lambing ewes were fed grain until turned on pasture about the middle of May. Early lambs were creep fed until weaning at an average of 120 days and then fed in dry lot until market. Late lambs were not fed grain until after weaning.

Fleeces were weighed to the nearest tenth of a pound at shearing time. Each lot was bagged separately and core samples were taken by the Wool Growers Association. These samples were scoured in the College Wool Laboratory to determine clean wool yield.

The results reported are a progress report of one year's data.

Table I. Comparison of Early Lambing with Late Lambing

	Early	Late
No. ewes bred	39	38
No. ewes failed to breed	1	4
No. lambs born per ewe bred	43	37
Lambing percentage	110	97
No. lambs raised	40	31
Av. lamb weights		
At 30 days	29.8	26.9
At 120 days	68.4	66.7
Av. wt. lambs at market	85.5	84.6
Av. market price	$ 18.75	$ 16.50
Feed cost (per ewe bred)		
For ewe	12.53	10.90
For lambs	6.23	4.52
Total	$ 18.76	$ 15.42
Fleece weight per ewe	8.2	8.3
Per cent clean wool	64.9	63.9

Feed prices used: Shelled corn and oats, $1.70/cwt; Soybean oil meal, $3.25/cwt.; alfalfa hay, $18.00/ton.

Table II. Comparison of Early Shearing with Late Shearing

Time of Lambing	Shearing Time	
	Early	Late
Early		
No. ewes	20	19
No. ewes failed to breed	1	0
Lambing % born	115	105
Lambing % raised	105	100
120 day lamb wts.	68.3	68.6
Shearing date	1-8	5-17
Fleece wt.	8.3	8.0
% Clean wool	67.3	62.4
Lbs. clean wool	5.7	5.0
Av. 1st service	August 25	August 18
Services/conception	1.5	1.5
Late		
No. ewes	18	20
No. ewes failed to breed	3	1
Lambing % dropped	94	100
Lambing % raised	78	85
120 day lamb wts.	63.0	64.4
Shearing date	1-8	5-17
Fleece wt.	8.8	7.9
% clean wool	67.7	60.1
Lbs. clean wool	6.0	4.8
Av. 1st service	November 9	November 8
Services/conception	1.1	1.1

SOUTH DAKOTA STATE COLLEGE
Animal Husbandry Department Brookings, South Dakota
Agricultural Experiment Station

A. H. Mimeo Series 61-16

Considerations For Improving Sheep by Breeding

J. W. McCarty

One hundred seventy lambs weaned in one of the Experiment Station's flocks in 1960 were sired by 9 different rams. Differences in performance among sire groups can be seen in the table below.

Table 1. Performance Summary South Dakota Station
No-Tail Flock - 1960 Season

	Sire No.									Total or
	1	2	3	4	5	6	7	8	9	Ave.
No. ewes bred	19	19	20	15	13	11	10	20	21	148
No. lambed	19	15	18	14	12	10	9	19	19	135
No. lambs	31	22	25	23	17	15	13	27	23	196
No. lambs per ewe bred	1.63	1.16	1.25	1.53	1.31	1.36	1.30	1.35	1.10	1.32
Ave. lamb birth weight										
Singles	10.2	9.7	9.7	12.1	10.3	11.3	10.7	11.7	12.4	10.9
Twins	10.2	9.0	9.5	9.6	9.1	9.0	9.8	9.4	9.6	9.5
Rams	10.0	9.2	10.2	10.7	9.8	10.6	10.3	10.8	12.2	10.4
Ewes	9.8	9.3	9.1	9.8	9.4	10.4	9.6	9.9	10.6	9.8
No. lambs, 120 days	27	20	23	21	15	12	12	24	16	170
Ave. 120 day weight	60.8	64.1	66.5	68.8	65.3	66.3	63.7	64.4	70.3	65.6
By type of rearing										
Singles	61.3	63.2	69.8	74.2	70.8	72.0	67.8	71.4	73.2	69.2
Twins	60.2	63.5	62.0	67.2	57.2	60.2	63.5	60.9	65.5	61.0
By sex										
Rams	59.7	64.9	72.6	70.2	50.6	70.5	66.5	65.5	77.1	67.6
Ewes	61.6	63.3	62.5	67.8	66.0	62.2	60.8	62.6	63.5	63.4

Most differences in the data are small. From the standpoint of using this information for selection of animals for breeding or as flock replacements, the following are apparent:

a. There are differences between sires in the gaining ability of their lambs.
b. Single lambs are heavier at birth and weaning than twins.
c. Ram lambs are heavier at birth and weaning than ewes.

Not shown in the table but also recognized is that ewes in the 4 to 6 or 7 year age range produce heavier lambs than either older or younger ewes.

These items point out some of the problems in attempting to improve sheep by breeding. The object, of course, is to save sheep which, on the basis of available information, have the highest estimated "breeding value." Since it is impossible to evaluate a sheep's heredity makeup directly, we must estimate "breeding value"

from the information available on performance and appearance. One of the difficulties in evaluating performance accurately is apparent in the table. That is, the variability. Variability is observed on all the economic characters--type, rate of gain, weaning weight, fleece weight, staple length, fleece quality, carcass quality--in every flock of sheep. Variability is at the same time a hindrance and a help in a breeding program. A hindrance because it is difficult to determine whether there is variation because animals differ in their heredity, or because of uncontrolled variations in the environment in which the sheep are raised or produced. A help because without variability there would be no opportunities for selection, or choosing among potential breeding animals.

Capitalizing on variability and using it to estimate "breeding value" as accurately as possible to help select genetically superior animals for breeding suggests the following procedures:

1. Identify lambs at birth.
2. Maintain flock under the best environment and management possible for the kind of production desired.
3. Keep records on the performance characters important in your program.
4. When evaluating records, remove as much of the environmental variation as possible by:
   (a) comparing animals of similar ages or adjust all weights to some standard age,
   (b) comparing animals from dams of similar ages,
   (c) comparing animals based on same type of rearing or within sex.
5. Sire differences may be large enough to indicate choosing among progeny within best performing sire groups.
6. To select for meatiness, check carcasses of 4 or 5 lambs in each sire group.
7. Use an index which combines the characters to be selected for.

There is no simple way to sheep improvement through breeding. Since an animal's performance is the result of some combination of both genetic and environmental influences, all possible information must be used to estimate the genetic or "breeding value." Only the genetic improvements are permanent.

Reproduction Studies in Sheep

J. F. Wagner

There are a number of approaches that the sheep producer can follow in order to have lambs dropped in or before the month of December. Any particular practice initiated will depend upon many factors in the total sheep operation and each producer must judge for himself the adaptability of each approach to his program.

With many of our Western breeds, the Rambouillet blood predominates which would enable the producer to breed at any time throughout the spring and summer months after weaning. Consequently, those breeders with Dorset, Rambouillet and other fine wool breeds can produce fall lambs simply by scheduling the breeding dates accordingly.

One of the simplest ways to hasten the lambing date is to turn the rams with the ewes during the last two weeks in July. Apparently, the association of the ewes with the rams will initiate the reproductive cycling process two to three weeks earlier than would be expected if kept separate. The problem encountered with this approach is the length of lambing season. Since the normal onset of breeding activity in the fall will vary between individuals within a breed and also between breeds, the ewes bred in this manner will be lambing throughout a six to eight week period.

Controlled environment offers another way that ewes can be induced to start cycling during the anestrous season. In most cases the cost of air conditioned barns with artificial lighting is too high for most breeders. However, it has been reported that ewe flocks in West Virginia have been driven into cool, dark caves for various periods during the summer months and in this way reproductive cycling activity was induced.

It is known that during the anestrous (without heat) period, the hormones from the pituitary and the ovary are not being secreted in a normal pattern necessary for reproductive activity. Consequently, another approach has been to force this normal pattern upon the anestrous ewe by giving the proper quantity of hormones in the necessary sequence in the feed or by injection. There are many facets included in the over-all reproductive phenomena such as:

1. Behavior - manifestation of heat
2. Pituitary function - regulate ovarian function
3. Ovarian function - production of a fertile ova
   production of hormones to:
   a) prepare uterus for fetus
   b) stimulate behavioral centers in the brain to induce heat

This is only a brief outline of the factors which need to be considered in attempting to induce with hormones the normal reproductive phenomena in the anestrous ewe.

At South Dakota State this approach to secure fall lambs (September, October, and November) is now under study. Essentially two practical approaches are being given consideration. One approach is to give a single injection of the hormone progesterone which has its effect over a 16 day period and prepare the uterus for implantation of the fertilized ova. This injection is followed on the 17th day

by another injection of follicle stimulating hormone derived from Pregnant Mare Serum (PMS). This causes the follicles on the ovary to grow and (1) produce ova which are released for fertilization approximately three days after injection, (2) produce estrogens which also prepare the uterus for implantation of the ova and induce heat in the ewe. Experimentally enough estrogen is not always produced by the PMS stimulated follicles to bring all the ewes into heat. Consequently, in some groups estrogen in very small quantities has been given one to two days after the PMS treatment. Briefly the treatment can be described as follows:

Inject progesterone - 16 days - Inject PMS - 1 day - inject estrogens

A second approach has been to substitute daily feeding of a progestational hormone (RS-1280 - Eli Lilly and Company) which is effective when given in the feed in place of a single injection. This entails the feeding of concentrate for a 16 day period, but variability of hormone action is greatly reduced.

What results have been accomplished to date? Considering the treatment of mutton breeds or those breeds which do not normally breed in the spring and summer, the results have been encouraging although as yet not out of the experimental stages. With treatments that I and my colleagues have used in the past, 25 per cent of the ewes treated in April and May can be expected to lamb in the fall. In one particular treatment 5 out of 6 ewes serviced on May 20 lambed on October 15. However, success with small numbers must be interpreted with caution. Further studies* are now underway here at SDSC and this fall we hope to see another step forward to the practical application of this approach to the production of fall lambs.

* For further reference see "Increasing the reproductive efficiency in the ewe." Spring issue of South Dakota Farm and Home Research, 1961.

SOUTH DAKOTA STATE COLLEGE
Animal Husbandry Department Brookings, South Dakota
Agricultural Experiment Station

A. H. Mimeo Series 61-13

Ram Performance and Progeny Test

Leon F. Bush

The sheep industry must continue to improve to maintain its position in a competitive economy. Selection is the only method which will bring about this improvement. Improvement can be done effectively through production records, especially on rams, as a supplement to current visual selection. Simultaneous selection should be made for the more important traits emphasizing each in proportion to its contribution to income.

Why should we performance test rams? There are several reasons. Large differences exist among individual animals. Some rams will gain almost twice as fast as others and some will produce as much wool. These differences cannot be predicted accurately by visual observations. They are partially controlled by inheritance. Accurately collected performance records are needed to measure these differences and proper use must be made of the records to improve flock production.

In studies where high producing rams have been compared with visually selected rams of high quality, the high performing rams sired lambs which were from 2.2 to 7.4 pounds heavier at weaning and had 7 to 9 per cent longer staple length.

A purebred breeder who is producing breeding stock should keep production records on his entire stud flock. It would be extremely beneficial if every commercial producer would keep production records on his flock. This may not be possible or practical. If not, he can improve his flock productivity by selecting high performing purebred rams to use in his flock.

What should the qualifications be for rams which are to be performance tested? Considerable time and effort as well as cost are involved in testing rams. Obviously it would be a waste to test undesirable rams. Rams should be selected at weaning time and those with desirable qualities tested. Rams with a high index and free from undesirable defects such as wool blindness, poor conformation, hairy britch, black spots, faulty mouths, etc. should be selected for the test.

Making good use of the results of performance testing is necessary. The top producing rams could be selected for stud rams for production of breeding stock. The remaining top producers would be used in commercial flocks with possibly some low performing rams disposed of as culls. A major opportunity exists for the purebred and commercial producer to use information from this test to select more productive rams.

This year only four sire groups were started on test July 8. The rams were self-fed a pelleted ration of 80 per cent alfalfa hay and 20 per cent concentrate for a 224 day period. Rate of gain and efficiency of gain are based on this period.

Rams were sheared on July 8 and again on February 21 giving a 228 day growing period. Staple length measurements were taken at shearing time. All wool data are reported on a 365 day basis.

Facing covering and breed type and conformation scores were obtained by a committee of three. These characteristics were scored from 10 to 1, 10 being the most desirable.

The fleeces were samples and scoured at the College Wool Laboratory to determine clean wool yield. Wool grade was determined by the cross section method on samples taken from the shoulder, side and rump area. Range in fiber diameter is reported in microns. The average fleece grade is given for each ram. The American grade for wool and corresponding range in microns is given below.

American Grade	Size in Microns
1/2	23.5 - 26.4
3/8	26.5 - 29.3
1/4	29.4 - 32.6
Low 1/4	32.7 - 34.3

Ram Test No.	Flock No.	Age in Days 2-17-61	Init. Wt. 7-8-59	Final Wt. 2-17-61	Total Gain	Av. Daily Gain	Feed/ 100 # Gain	Grease Fleece Wt.	Clean Fleece Wt.	Staple Length in.	Fiber dia. Range in Microns	Fleece Grade	Face Cover	Breed Type Conf.
			Sire: 361300			Owner: Everett Baxter, Hazel, South Dakota								
1	718	428	140	228	88	0.393		10.1	5.6	3.8	30-32	1/4	7.0	4.3
2	721	413	129	218	89	0.397		11.7	6.3	4.7	28-32	1/4	6.0	4.0
3	720	425	146	245	99	0.442		12.3	5.8	3.8	28-35	1/4	7.0	6.0
4	742	402	145	243	98	0.438		11.3	6.7	4.7	29-33	1/4	5.6	6.3
Av.		417	140	233	93	0.417	1664	11.3	6.1	4.2			6.4	5.2
			Sire: NDAC 7-41 342257			Owner: Hugh Barnett, Brookings, South Dakota								
5	1536	377	102	232	130	0.580		12.4	8.4	4.4	33-35	L1/4	3.0	7.0
6	1518	379	93	221	128	0.571		12.0	7.8	5.0	32-35	L1/4	6.0	6.0
7	1528	379	121	234	113	0.504		11.2	7.9	4.1	30-35	L1/4	5.6	7.3
8	1584	370	109	228	119	0.531		14.0	8.5	4.4	29-33	1/4	6.6	6.6
Av.		376	106	229	122	0.547	1255	12.4	8.1	4.5			5.3	6.7
			Sire: Rose Hill 501 331942			Owner: Fuller Bros., Clark, South Dakota								
9	602	408	127	267	140	0.625		10.1	5.8	4.7	31-35	L1/4	4.0	7.0
10	554	424	121	230	109	0.487		10.6	5.1	3.8	32-33	L1/4	4.6	4.6
11	570	422	121	230	109	0.487		10.0	4.3	4.1	28-33	1/4	9.0	4.0
12	556	424	117	242	125	0.558		12.1	5.6	4.7	30-31	1/4	4.0	5.0
Av.		419	121	242	121	0.539	1404	10.7	5.2	4.3			5.4	5.2
			Sire: Schiefelbein 669 349415			Owner: SDSC, Brookings, South Dakota								
13	0-182	359	84	190	106	0.473		9.4	4.7	3.8	27-29	3/8	6.3	4.0
14	0-165	368	78	205	127	0.567		11.7	6.4	4.1	30-31	1/4	6.3	5.0
15	0-79	392	110	225	117	0.522		9.7	6.2	4.1	31-32	1/4	5.3	6.0
Av.		373	91	207	117	0.521	1324	10.3	5.8	4.0			6.0	5.0
Av.			116	229	113	0.505	1412	11.2	6.3	4.3			5.7	5.5
58-59			102	210	108	0.48	1134	12.0	7.0	3.5			5.1	6.7
59-60			109	191	85	0.38	1460	12.0	6.6	4.2			5.1	5.4